Fiscal Studies (1996) vol. 17, no. 4, pp. 1–30

Income Support and Staying in School: What Can We Learn from Australia's AUSTUDY Experiment?

LORRAINE DEARDEN and ALEXANDRA HEATH[1]

I. INTRODUCTION

In Australia, as in most industrialised countries, there has been a dramatic increase in unemployment rates over the last three decades. The teenage labour market, in particular, has undergone significant structural changes which have resulted in large increases in the rate of unemployment among teenagers. The proportion of children staying on at school past the minimum leaving age and higher-education participation rates have also been rising over this period. Despite this, the overall full-time education participation of Australian teenagers remains low compared with that in most other OECD nations.

In the 1986-87 Budget, the Australian government introduced a new student income support policy initiative to address the twin problems of rising youth unemployment and low school and higher-education participation rates. The scheme, known as AUSTUDY, is essentially a means-tested income support scheme for both full-time higher-education students and secondary students completing their final two years of school. It replaced a number of earlier income support schemes for full-time students and was accompanied by changes to

[1] Lorraine Dearden is at the Institute for Fiscal Studies; Alexandra Heath is at the Suntory and Toyota International Centres for Economics and Related Disciplines (STICERD), London School of Economics and Political Science.

The authors would like to thank Andrew Dilnot, Chris Giles and two anonymous referees for helpful comments and suggestions. Chris Giles also ran the IFS Tax and Benefit Model (TAXBEN) simulations used in the paper, for which the authors are grateful. Errors are, of course, their own.

income support arrangements for unemployed teenagers. The policy changes resulted in a dramatic increase in the availability and amount of income support for full-time students, particularly those in the final two years of secondary school. At the same time, there was also a substantial reduction in the amount and availability of income support for unemployed teenagers.

There is no equivalent education allowance scheme operating in the United Kingdom that specifically targets children remaining in secondary school. Mothers of children in full-time education aged 16 years or over, however, still receive child benefit for that child. The maximum amount payable for a child from child benefit is £10.80 per week and this benefit is not subject to any means test. AUSTUDY, on the other hand, is paid directly *to the child* rather than to the mother and it is means-tested on the parents' income.[2] The maximum level of the AUSTUDY allowance is considerably more generous than child benefit: in 1996, the maximum level of AUSTUDY available to a 16-year-old secondary student living at home was $70.30, or around £35,[3] per week.[4]

In Australia from 1974 to 1987, government policy initiatives for increasing higher-education participation focused on a system of free tertiary education, coupled with means-tested income support for tertiary students, called the Tertiary Education Allowance Scheme (TEAS). The level of income support payable to eligible full-time tertiary students was well below that payable to unemployed people of the same age. By the mid-1980s, it was apparent that the composition of tertiary students had not changed significantly since the abolition of tertiary fees and the introduction of TEAS in 1974. This was primarily due to the fact that a large proportion of teenagers whom the policies were trying to target were not actually completing secondary school. Thus the introduction of AUSTUDY also represents a shift in the focus of Australian education policy from tertiary to upper secondary education.

A number of interesting questions arise out of the preceding discussion and form the focus of this paper. To what extent has the recent rise in the proportion of school students completing the final two years of secondary school been due to changes in government income support policy for teenagers and / or to the deteriorating labour market? Have the changes in income support arrangements for students and the unemployed affected the probability of a child from a relatively poor background staying on past the minimum school-leaving age? What are the policy implications for other countries with relatively low school retention rates, such as the UK?

Although commentators have examined the operation of AUSTUDY (for example, Chapman (1992)) and the determinants and effects of schooling (for example, Miller and Volker (1987a), Vella and Gregory (1996), Dearden (1995)

---

[2] A more detailed account of the operation of AUSTUDY is provided in Section III, especially Table 2.

[3] This figure assumes an exchange rate of one British pound to two Australian dollars.

[4] This is approximately the amount that teenagers on Youth Training in the UK receive.

and Miller, Mulvey and Martin (1995)), the question of what impact the introduction of AUSTUDY has had on secondary-school retention rates in Australia has not been canvassed in any more than a cursory sense. In this paper, we use the Australian Longitudinal Survey (ALS) and the Australian Youth Survey (AYS) to determine what contribution the introduction of AUSTUDY has made towards the increase in secondary-school retention rates since 1987. These sources provide information on the amount of AUSTUDY received after 1987, as well as other variables, such as father's and mother's education and employment status, state of residence and number of siblings, that have been shown in other research to be important influences on the continuation decision.

The results show that AUSTUDY has contributed to the increase in retention rates since 1987. In particular, the retention rates of the group targeted by the policy initiative — namely, those from less financially privileged backgrounds — have increased by between three-and-a-half and four percentage points over the period 1989-93 as a direct result of the introduction of AUSTUDY.

In Section II, we summarise the changes in the Australian youth labour market and in their education activities. Section III discusses the major changes in education and youth labour market policy in more detail. Section IV explains the data and methodology we use to estimate the impact of AUSTUDY on the probability of completing the final two years of secondary school. The results of the study are presented in Section V. The policy implications for Australia and some policy alternatives for the UK are discussed in Section VI.

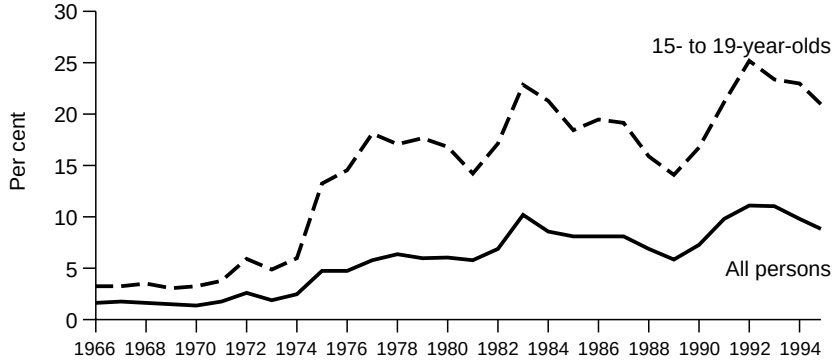
II. THE CHANGING ACTIVITIES OF AUSTRALIAN TEENAGERS

The structure of the teenage labour market, and consequently the major activities of Australian teenagers, have changed quite markedly over the last 25 years. One reflection of these changes is the unemployment rate. The average unemployment rate in Australia has risen from 4 per cent in the 1970s to well over 8 per cent since 1980 (Figure 1). Within this aggregate, the highest unemployment rates are experienced by youth, particularly in the 15- to 19-year-old age-group. Unemployment rates for teenagers rose quite sharply in the mid-1970s and again during the 1982-83 recession. While there was some reversal of this upward trend during the late 1980s, youth unemployment rates reached new heights during the recession in the early 1990s.

To some extent, the relatively high youth unemployment rates reflect the higher turnover rate in the youth labour market, as youth tend to experience more frequent but shorter spells of unemployment. In recent years, however, there has been a marked increase in the proportion of young unemployed people who are experiencing very long durations of unemployment.

FIGURE 1

Unemployment Rates



Source: Australian Bureau of Statistics, *The Labour Force*, Cat. no. 6203.0, various issues.

The rise in unemployment levels has been accompanied by significant falls in the proportion of teenagers employed as their major activity (Figure 2). Overall, the teenage labour force has shrunk, and peaks in the unemployment to population ratio for teenagers for the recessions in 1982-83 and in the early 1990s are of roughly equal magnitude.

The compensating trend has been the steady increase in the proportion of teenagers participating in full-time education. Of particular interest is the increase in apparent high-school retention rates (Figure 3).[5] Although female retention rates were lower than male retention rates in the 1960s, they rose sharply through the 1970s, and by 1990, the female retention rate was 70 per cent compared with the male retention rate of 59 per cent.

Historically, Australia's aggregate high-school retention rates and full-time education participation rates have been low by OECD standards. Table 1 groups OECD countries according to full-time secondary-school retention rates for 16-, 17- and 18-year-olds in 1992. Australia, along with the UK, performs relatively poorly, though the UK has seen significant increases since 1992.[6]

The next section discusses education and teenage labour market policy initiatives that have been designed to respond to the increasingly poor performance of the youth labour market and to the internationally low level of retention rates in Australian secondary schools.

---

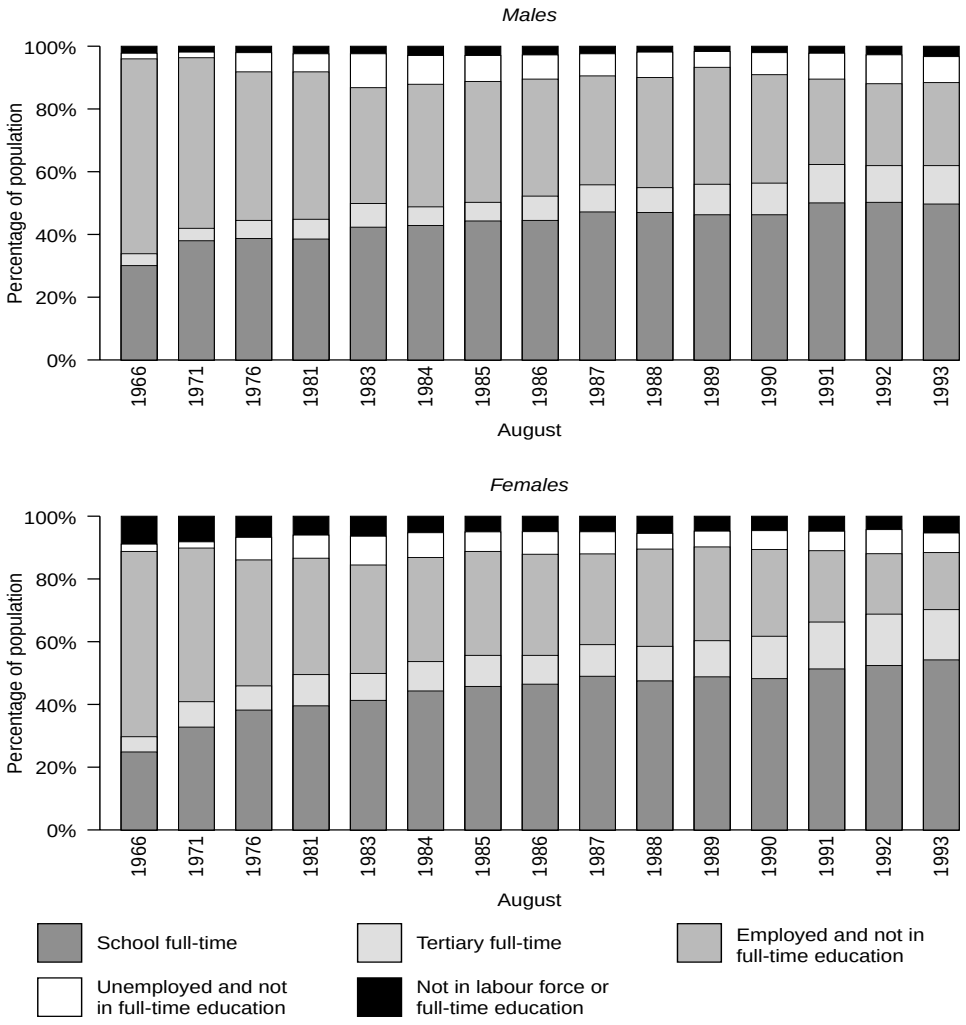
[5] Apparent high-school retention rates are calculated as the number of students completing Year 12 (the final year of secondary school) in the given year divided by the size of the cohort that entered secondary school six years earlier, adjusted for factors such as interstate and overseas migration and grade repetition.

[6] The school retention rates for 18-year-olds shown in Table 1 are misleading as differences in retention rates by the age of 18 are also driven by differences in the school-leaving ages of different countries.

Figure 2

Major Activity Profiles of 15- to 19-Year-Olds

Note: We classify a person by their major activity only and therefore all categories are mutually exclusive.



Sources: Australian Bureau of Statistics, The Labour Force, Cat. no. 6203.o, various issues; Department of Employment, Education and Training, unpublished data.

TABLE 1

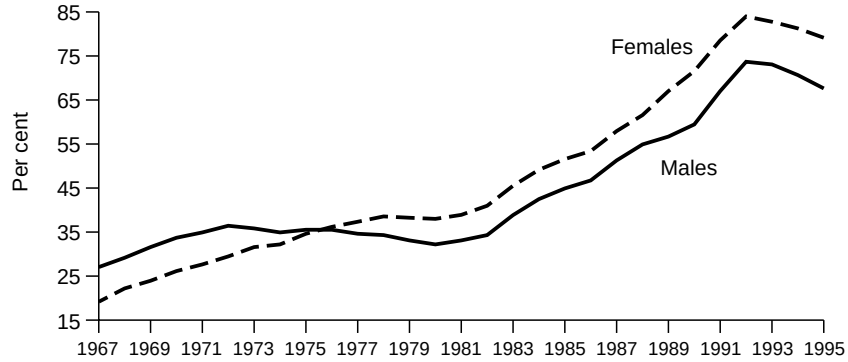
Full-Time Retention Rates in Secondary Education, 1992

At age 16		*At age 17*		*At age 18*	
Greater than 90 per cent		*Greater than 80 per cent*		*Greater than 50 per cent*	
Netherlands	97.3	Belgium	93.6	Germany	82.3
Belgium	97.2	Germany	92.8	Finland	79.7
Canada	96.3	Netherlands	90.8	Norway	77.2
Germany	95.3	Japan	90.3	Switzerland	74.2
Japan	95.1	France	87.2	Denmark	68.9
Norway	92.8	Sweden	87.0	Netherlands	67.9
Denmark	92.4	Norway	86.6	Sweden	59.6
France	92.1	Finland	85.8	France	58.6
United States	91.4	Switzerland	82.0		
		Denmark	80.1		
Between 80 and 90 per cent		*Between 60 and 80 per cent*		*Between 20 and 50 per cent*	
Sweden	89.2	Canada	72.0	Belgium	49.8
Greece	88.4	United States	72.0	Canada	36.9
New Zealand	87.8	Ireland	70.2	Spain	35.5
Ireland	87.5	Spain	66.9	Ireland	33.1
Switzerland	85.2	New Zealand	65.7	New Zealand	20.8
		Greece	62.1	United States	20.6
Less than 80 per cent		*Less than 60 per cent*		*Less than 20 per cent*	
Australia	78.7	Australia	58.8	Turkey	19.8
Spain	75.6	United Kingdom	55.3	Greece	19.4
United Kingdom	75.3	Turkey	33.9	United Kingdom	18.7
Turkey	39.3			Australia	14.2
				Japan	1.8

Note: Based on full-time enrolments in public and private upper secondary schools.
Source: Centre for Educational Research and Innovation and OECD (1995).

FIGURE 3

Apparent High-School retention Rates



Sources: Australian Bureau of Statistics, Participation in Education, Australia, Cat. no. 6270.0, various issues; Department of Employment, Education and Training, 1991.

III. TEENAGE EDUCATION AND LABOUR MARKET POLICY

From 1974 until the mid-1980s, a major focus of Australia's education policy was to ensure equal access to tertiary education. This was signalled in 1974 when fees for tertiary education were abolished. At the same time, means-tested income support for full-time students was provided by the Tertiary Education Allowance Scheme (TEAS) and Secondary Allowance Scheme (SAS).

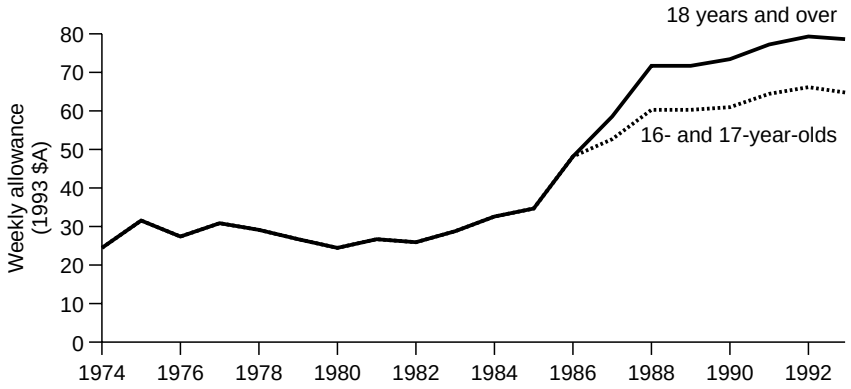
SAS was paid to parents, and the real value of the maximum payment was very low and did not vary greatly over the 12 years the scheme was in operation (Figure 4). The number of secondary students receiving SAS was also quite low: in 1977, coverage was only 2 per cent of the relevant student cohort; the proportion of students receiving SAS remained below 5 per cent until 1983 and peaked at 15 per cent in 1986. TEAS was paid to eligible full-time higher-education students directly and was more generous than SAS, but both allowances were substantially lower than the non-means-tested benefit paid to unemployed teenagers.

By the mid-1980s, it was apparent that there were several problems with the focus of education policy in general and with several of the institutional aspects of SAS in particular. Despite the abolition of tertiary education fees, there had not been a significant change in the demographic make-up of higher-education participants. Students from financially constrained and disadvantaged families tended to be the ones who did not complete secondary school and thus were

precluded from benefiting from the provision of free tertiary education. In an extensive survey of low-income families, Braithwaite (1987) looked at the effectiveness of SAS. He found that the number of eligible families taking advantage of SAS payments was surprisingly low, and that the relatively high levels of unemployment benefits acted as a disincentive to completing secondary school.

FIGURE 4

Real Value of Maximum Weekly SAS / ASTUDY Payments



Source: Department of Employment, Education and Training, unpublished data.

These issues were clearly in the minds of the policymakers when they announced the introduction of AUSTUDY in the 1986-87 Budget. The Minister for Employment and Industrial Relations, Susan Ryan, introduced the policy initiative in the following way:

> The significant increases in allowances being implemented by the Government provide a much stronger incentive for young people to study and secure qualifications which will help them find and keep employment. The scheme with its much improved allowances for students will remove the disincentive to study which arose from the fact that the unemployment benefit outstripped the basic rates of education allowances for young people.[7]

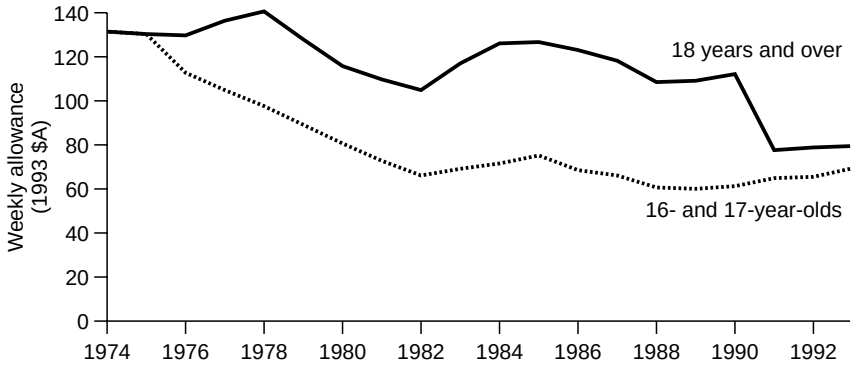
The introduction of AUSTUDY involved substantial real increases in the level of income support provided to students, particularly secondary-school students, and the benefit is generally received by the student and not their parents. This brought payments made to eligible 16- and 17-year-old secondary students into line with the job search allowance (JSA), a new form of

[7] The Treasury, 1986.

unemployment benefit payments payable to unemployed youth (Figures 5 and 6).[8] The JSA was no longer universally paid to all unemployed 16- and 17-year-olds but, like AUSTUDY, was now means-tested on parents' income. Those eligible to receive JSA had to wait 13 weeks after leaving school before they could receive any payment. From September 1990, the level of unemployment benefit payable to 18- to 20-year-olds living at home was also lowered to bring the maximum benefit into line with AUSTUDY rates.

FIGURE 5

Real Value of Maximum Weekly Unemployment Benefit / JSA Payments



Source: Department of Social Security, *Annual Report*, various issues.

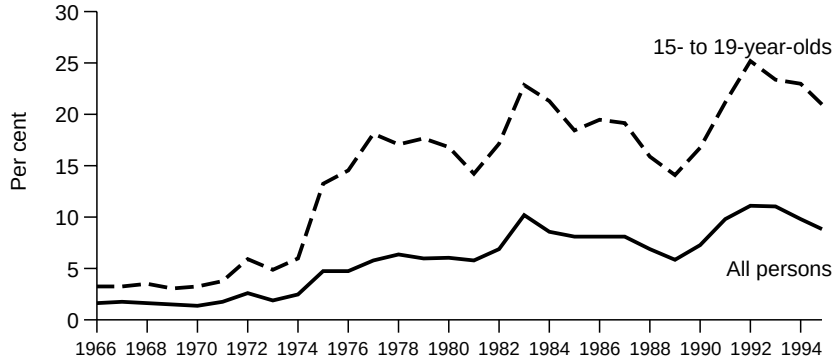
AUSTUDY also had a more generous means test than SAS, and was widely advertised to raise awareness as a part of the `Priority One' education policy initiative. The combined effect was that the proportion of students receiving AUSTUDY increased to well over 30 per cent.

A further sign of the shifting focus of education policy was the reintroduction of tertiary fees via a Higher Education Contribution Scheme (HECS) in which part of the cost of tertiary study is recouped in the form of a delayed payment collected through the taxation system when the student enters the labour market. This allowed some of the funding that would otherwise have gone to tertiary education to be redirected towards supporting students from low-income families. The introduction of HECS was also motivated by a desire to expand the capacity of the tertiary sector.

[8] AUSTUDY is means-tested on parents' income unless the student qualifies for the `independent' rate. Students are regarded as independent if they have worked for three of the last five years or have turned or will turn 25 in the year of study. Income earned by the student is also taken into account in assessing the amount of AUSTUDY paid.

FIGURE 6

Ratio of SAS / AUSTUDY Payments to Unemployment / JSA Payments



Source: Department of Employment, Education and Training, unpublished data; Department of Social Security, *Annual Report*, various issues.

The main features of AUSTUDY are that it is means-tested on parents' income and that the amount payable depends on the child's adjusted family income (AFI). This AFI takes into account the number of dependent children under the age of 16 in the family. The amount that is payable and the rate of abatement are also affected by the number of other `eligible siblings' —namely, brothers or sisters aged 16 or over in full-time education. If a student receives AUSTUDY, their parents are no longer permitted to receive family allowance (the Australian equivalent of child benefit) for that child or other social security payments associated with supporting the child.[9] There is also a limit on the amount of income students can earn from part-time work, and if this is exceeded, the student loses $1 per annum of support for every $2 per annum earned over the limit. The 1989 and 1992 eligibility rules for AUSTUDY for secondary students living at home are shown in Table 2.

[9] If families are better off receiving family allowance and other social security payments for children, then they can choose not to receive AUSTUDY. Family allowance from November 1987 became subject to an income test which effectively precluded relatively rich households from receiving the benefit. The number of family allowance recipients at 20 June 1988 was 1,948,234 compared with 2,136,668 at the same time in 1987. This drop of almost 10 per cent is directly attributable to the introduction of the income test in November 1987 (Department of Social Security, 1988).

TABLE 2

AUSTUDY Eligibility Rules for Secondary Students Living at Home

The amount of AUSTUDY payable depends on the student's *adjusted family income (AFI)* for the previous financial year. To calculate the AFI:

Add:

1. Taxable income of parents / guardians
2. Overseas taxable income
3. Maintenance payments received by the parents / guardians

Deduct:

1. $1,200 for the first dependent child in the family who is under 16
2. $2,500 for each other dependent child in the family who is under 16
3. Any maintenance paid by the parents / guardians

1989 eligibility rules	*16- to 17-year-olds*	*18-year-olds*
Maximum weekly payment	$53.55	$64.30
Maximum payable when AFI less than	$16,950p.a.	
reduced by (only eligible student)	$2.50p.a. for each additional $10p.a.	
reduced by (one eligible sibling)	$2.50/2=$1.25p.a. for each additional $10p.a.	
reduced by (two eligible siblings)	$2.50/3=$0.83p.a. for each additional $10p.a.	
etc.		
AUSTUDY payable if household assets less than	$300,000 (excluding private home)	
Maximum payable when student income less than	$3,000p.a.	
reduced by	$1p.a. for every additional $2p.a.	

1992 eligibility rules	*16- to 17-year-olds*	*18-year-olds*
Maximum weekly payment	$64.15	$77.10
Maximum payable when AFI less than	$20,700p.a.	
reduced by (only eligible student)	$2.50p.a. for each additional $10p.a.	
reduced by (one eligible sibling)	$2.50/2=$1.25p.a. for each additional $10p.a.	
reduced by (two eligible siblings)	$2.50/3=$0.83p.a. for each additional $10p.a.	
etc.		
AUSTUDY payable if household assets less than	$359,250 (excluding private home)	
Maximum payable when student income less than	$5,000p.a.	
reduced by	$1p.a. for every additional $2p.a.	

Note: As an approximation, one can convert 1989 Australian dollars ($A) figures into 1996 $A by dividing relevant figures by 0.852 and into 1996 British pounds (£) by dividing the relevant figure by 1.704. To convert 1992 $A figures into 1996 $As, divide relevant figure by 0.924; to convert 1992 $As into 1996 £s, divide by 1.848. For example, $64.15 per week in 1992 is approximately equivalent to £34.70 per week ($64.15/1.848) in today's prices.

IV. DATA AND METHODOLOGY

1. Data

The data used to analyse these questions are the Australian Longitudinal Survey (ALS) and the Australian Youth Survey (AYS). The ALS commenced in 1985, with 9,000 people (aged 16 to 25) selected randomly across Australia. This group was re-interviewed annually until 1988, with a subset of the original group (those aged 16 to 20 in 1985) being interviewed up until 1991. No new candidates were interviewed in this survey. The AYS began in 1989 and interviewed a nationally representative group aged 16 to 19 in 1989. Each year, this cohort is re-interviewed and a new cohort of 16-year-olds is added. The surveys have detailed information on the respondent's family background, schooling experience, post-school education and training, transition to work and labour market experience as well as income. The surveys are very similar in nature to the US National Longitudinal Survey of Youth (NLSY).

We use data for 1984 to 1986 from the ALS and for 1989 to 1993 from the AYS. Our sample consists of all individuals aged between 16 and 18 years in our data, who were or could have been in the final two years of school in the survey year.[10] We also restrict our sample to individuals living at home who are not married. Married students applying for AUSTUDY are means-tested on their spouse's income rather than their parents' income.

The variables we use in our analysis are similar to those used in previous studies looking at the education participation decision, such as Miller and Volker (1987a, 1987b and 1989) and Dearden (1995). These include the aggregate unemployment rate as a proxy for general labour market conditions;[11] the type of school the individual attended (government (the base group), Roman Catholic or other private); the state in which the individual attends or last attended school, to pick up differences between the state education systems;[12] and the geographic region where the individual lived at the age of 14, distinguishing capital cities (the base group), other cities, country towns, rural areas and overseas.

We also include a host of family background variables such as father's and mother's highest education qualification; whether the individual lived with both parents (the base group), mother only, father only or neither parent at the age of 14; the number of siblings the individual has and the number of children aged

[10] We use data from the 1985 ALS to construct a cross-section of individuals who fit this criterion for 1984.

[11] The unemployment rate we use varies by gender, year and state of residence.

[12] Education in Australia is under state and not federal government control. School education varies quite significantly between states. For example, in Victoria and South Australia, a student will receive an intermediate qualification if they leave in the second-last year of high school (Year 11), whereas in the other states there is no recognised qualification for leaving at this point. In states such as Queensland and South Australia, there are only 12 rather than 13 years of school education, which means that school graduates are generally younger in these states.

over 15 years in the household (from the same family); the individual's ability in English if born overseas; and a measure of mother's and father's socio-economic status when the child was 14, based on the ANU3 scale developed by Jones (1989).[13]

TABLE 3

Key Summary Statistics

	Year 11 participation rate	*Year 12 participation rate*	*Year 11 and 12 participation rate*	*Proportion of secondary-school students receiving AUSTUDY*
1984	0.640 (745)	0.443 (742)	0.542 (1,487)	
1985	0.649 (740)	0.495 (893)	0.565 (1,633)	
1986	0.503 (189)	0.489 (691)	0.492 (880)	
1989	0.747 (1,239)	0.486 (1,343)	0.611 (2,582)	0.281 (1,578)
1990	0.764 (1,161)	0.634 (1,246)	0.697 (2,407)	0.330 (1,677)
1991	0.849 (1,041)	0.691 (1,174)	0.765 (2,215)	0.360 (1,693)
1992	0.778 (315)	0.777 (1,039)	0.777 (1,354)	0.384 (1,051)
1993	0.748 (314)	0.787 (996)	0.778 (1,310)	0.380 (1,019)
1984–86	0.628 (1,674)	0.477 (2,326)	0.540 (4,000)	
1989–93	0.780 (4,070)	0.663 (5,798)	0.711 (9,868)	0.342 (7,018)
All years	0.736 (5,744)	0.610 (8,124)	0.662 (13,868)	

Note: Sample sizes are given in parentheses.

[13] This is a synthetic scale that measures the relative differences in labour market power, occupational prestige, occupational requirements and occupation rewards which can be mapped directly to the four-digit Australian Standard Classification of Occupations (ASCO). In this paper, we map this scale to the parents' two-digit ASCO code when the child was aged 14. This involves mapping the slightly different occupational codes used in the AYS to an appropriate ASCO code. The scale ranges in value from 0 to 96.6 and is used rather than detailed occupational dummies for reasons of parsimony.

This leaves us with a final sample of 13,868 individuals, of whom 4,000 are in the pre-reform years of 1984 to 1986 (the ALS sample) and 9,868 are in the post-reform years of 1989 to 1993 (the AYS sample). Key summary statistics for our sample are given in Table 3, while detailed summary statistics are given in the Appendix.

2. Methodology

The aim of this paper is to assess the impact AUSTUDY has had on the decision to stay at secondary school for the final two years of school (Years 11 and 12) since its introduction in 1987. We also want to estimate what Year 11 and 12 participation rates would have been in 1984 to 1986 if AUSTUDY had been in operation in those years. In Australia, schooling is compulsory until the age of 15 and this effectively means that almost all students complete Year 10.

Modelling the relationship between the school continuation decision and AUSTUDY is not straightforward. First, it is only individuals in our sample who remain in school after 1988 for whom we have information on whether they are eligible for AUSTUDY and the amount they receive if eligible. Second, it is very likely that there are unobserved individual characteristics, in particular family income, that determine both the probability of receiving AUSTUDY and the probability of staying in school. If we do not take this endogeneity into account, our estimates of the effect of AUSTUDY on the probability of staying in school will be biased.

Two methods that attempt to control for the problems identified above are employed to obtain an estimate of the effect of the introduction of AUSTUDY on the probability of completing the final two years of secondary school. The first is a two-stage instrumental variable method and the second is an experimental approach. These are discussed in more detail below.

Two-Stage Instrumental Variable Procedure

In our two-stage estimation procedure, the first stage estimates the determinants of the probability of an individual being eligible for AUSTUDY, for those in school after 1988. We do this by estimating a probit maximum likelihood equation of the probability of receiving AUSTUDY. We use the results from these first-stage regressions to predict the probability of receiving AUSTUDY for all individuals in our sample. These predictions are then used in the second stage of our procedure to estimate the impact AUSTUDY has had on the continuation decisions of individuals since 1988 and the impact it would have had on the continuation decisions of individuals before 1988 if it had been in place.

To carry out this two-stage instrumental variable procedure, we require an `instrument' for AUSTUDY receipt. This instrument needs to be an exogenous variable that explains AUSTUDY receipt but not the continuation decision

controlling for AUSTUDY receipt. The exogenous instrument that we use is the number of siblings aged over 15 years in the individual's household. As we saw in Table 2 above, the probability of receiving AUSTUDY increases if there are more `eligible siblings' in the family, since the parental income test is relaxed. An `eligible sibling' is any sibling aged 16 years or over in full-time education. We argue that the number of siblings aged over 15 in the household is a good exogenous proxy of the number of eligible siblings.[14] The number of children over 15 in the household should be positively related to the probability of receiving AUSTUDY, but should not affect the individual's continuation decision, controlling for AUSTUDY eligibility and other family characteristics such as the total number of children in the family. The total number of children in the family should also be an important determinant of AUSTUDY eligibility, as it will affect the calculation of the family's adjustable family income (see Table 2). Family size, however, has been shown in a number of studies (for example, Miller and Volker (1987a and 1987b) and Dearden (1995)) to be a very important determinant of the school continuation decision and as such is not a valid instrument. Variables that proxy family income, such as parents' education, are not valid instruments either, because they are well known to affect the education continuation decision (Miller and Volker, 1989; Dearden, 1995).

In the first stage of our estimation procedure, we look at the determinants of AUSTUDY eligibility for those individuals in school after 1988. Our dependent variable is discrete, taking the value one if the individual receives AUSTUDY ($E_{it} = 1$) and the value zero if they do not ($E_{it} = 0$). Because we have a discrete dependent variable, we have to use a probit maximum likelihood procedure. More formally, we assume that there is some unobserved measure of an individual's eligibility for AUSTUDY (E^*_{it}) that we can model as

(1) $E^*_{it} = X_{It}\,'\beta + \gamma ch15_{it} + \varepsilon_{1it}$ for $t > 88$ and i = individuals in school,

where $E_{it} = 1$ if $E^*_{it} \geq 0$ (individual i is eligible for AUSTUDY at time t);
$E_{it} = 0$ otherwise (individual i is not eligible for AUSTUDY at time t);
X_{it} is a vector of family background variables and year dummies;
$ch15_{it}$ is the number of children in the household who are older than 15 years;
and ε_{1it} is the random error for individual i at time t.

The variable *ch15* — the number of children in the household older than 15 years — is our 'instrument' for AUSTUDY eligibility, and exclusion of this

[14] The surveys do not give us any information on the age of siblings not living in the household, though we do know the total number of siblings and the number of siblings older than the respondent when they were aged 14. We use the number of siblings aged over 15 or `potential eligible siblings' rather than the number of siblings over 15 in full-time study, as this latter variable may have also been affected by AUSTUDY eligibility of the siblings and is therefore potentially endogenous.

variable from our second-stage continuation equation ensures that our model is identified.

From equation (1), we obtain a prediction of AUSTUDY eligibility $\hat{E}^*_{it}$, for the whole sample[15] including individuals who had left school after 1988 and our whole pre-1988 sample. In the probit model, the predicted probability of receiving AUSTUDY is given by $\Phi(\hat{E}^*_{it})$, where Φ is the cumulative normal distribution function.

In the second stage, we look at the impact of predicted AUSTUDY eligibility on the Year 11 and 12 participation decision for our whole sample. For all individuals before 1988 (when AUSTUDY was not in operation), we set predicted AUSTUDY eligibility equal to the mean of $\hat{E}^*_{it}$ for those individuals who were in school after 1988 and who did not receive AUSTUDY. Again, our dependent variable is discrete, taking the value one if a person continues on at school ($cont_{it} = 1$) and the value zero if they do not ($cont_{it} = 0$), which means that we again need to use a probit maximum likelihood procedure. We assume that the unobserved benefit of continuing on in education ($cont^*_{it}$) can be modelled using the following equation:

$$(2) \qquad cont^*_{it} = X_{it}' \, \delta + \alpha \, \hat{E}^*_{it} + \varepsilon_{2it}, \; t = 84,85,86,89,90,91,92,93,$$

where $cont_{it} = 1$ if $cont_{it} \geq 0$ (individual i remains in school at time t);
$cont_{it} = 0$ otherwise (individual i leaves school at time t);[16]
and ε_{2it} is the random error for individual i at time t.

The estimates obtained from this equation allow us to estimate both the impact AUSTUDY has had on the participation decision of our post-reform cohort and the impact it would have had on our pre-reform cohort if it had been in operation for those individuals whom the programme is meant to target (children from relatively disadvantaged backgrounds).

The Experimental Approach

The second method we use involves identifying a control group of individuals whose continuation decision, because of their family circumstances, has not been affected by the AUSTUDY policy change. This control group will consist of children from relatively well-off families. We then use this control group to estimate the determinants of the continuation decision over our entire time

---

[15] $\hat{E}^*_{it} = X_{It}' \, \beta + \gamma ch15_{it} + \varepsilon_{1it}$ where β and γ are our estimated coefficients from our probit maximum likelihood procedure.

[16] This means that individuals who have left school but have instead enrolled in some other form of full-time education are treated like individuals who have left school and have not continued in full-time education (i.e. for these individuals, $cont_{it} = 0$). Our results do not change significantly if we instead exclude these individuals from our sample.

period free of the influence of policy. The control group is identified as those for whom the predicted probability of receiving AUSTUDY is below the median for our entire sample.[17] It should be noted that the way we identify our control and non-control, or `treatment', groups involves using the same `identifying' assumption we used in our instrumental variable procedure above. We then use the estimated coefficients from this continuation regression to predict the probability of continuation in the absence of the policy for our treatment group. The predicted values of continuation for our treatment group in the absence of the policy reform are then included with a policy dummy variable (which takes the value of 1 for our post-1988 treatment sample) to determine the impact of the policy change on the continuation behaviour of this group.

More formally, we begin by estimating a continuation equation for all individuals for whom the predicted probability of receiving AUSTUDY is below the median value for the whole sample. Our estimation equation is given by

$$(3) \qquad cont^{*}_{it} = X_{it}' \rho + \varepsilon_{3it}, \quad \text{if } \Phi(\hat{E}^{*}_{it}) < \text{Median } (\Phi(\hat{E}^{*}_{it})), \quad t = 84,85,86,89,90,91,92,93,$$

where ε_{3it} is the random error for individual *i* at time *t*.

Our control group should contain individuals whose family income is high enough that they would never be considered eligible for AUSTUDY. The predicted probability of continuing without the influence of policy can be calculated from the estimates of equation (3) for the whole sample and is given by

$$\Phi(\hat{cont}^{*}_{it}) = \Phi(X^{'}_{it}\hat{\rho})$$

where Φ is the cumulative normal distribution function and ρ are the estimated coefficients from our probit maximum likelihood procedure on the control group. The effect of the policy can then be estimated by a probit maximum likelihood procedure on the following equation estimated on the treatment group only:

[17] .This means that exactly 50 per cent of our sample are in our control group. The choice of size for our control group is somewhat arbitrary. From our control group, we aim to estimate the determinants of the school participation decision free of the influence of the change in policy. Around one-third of students in their final two years of school now receive AUSTUDY. By only including the `richest' 50 per cent of individuals in our sample, we should be able to obtain a relatively precise estimate of the determinants of the continuation decision free of the influence of policy. We have conducted a number of experiments in defining our control group and we obtain reassuringly similar results when we do this (see Heath (1996) for more details).

$$(4) \qquad cont^*_{it} = \eta \hat{cont}^*_{it} + \theta policy + \varepsilon_{4it} if \Phi(\hat{E}^*_{it}) \geq Median(\Phi(\hat{E}^*_{it}))$$
$$t = 84,85,86,89,90,91,92,93,$$

where

$$\hat{cont}^*_{it} = X'_{it}\hat{\rho};$$
$policy = 1$ if $t > 1988$;
$policy = 0$ if $t < 1988$;
and ε_{4i} is the random error for individual i at time t.

The estimates obtained from this equation again allow us to estimate both the impact AUSTUDY has had on the continuation decision of our post-reform cohort and the impact it would have had on our pre-reform cohort if it had been in operation for those individuals whom the programme is meant to target.

Advantages and Disadvantages of the Two Approaches

The two approaches we use in this paper have a number of limitations and these should be borne in mind when interpreting the results in the following section.

First, the methods completely ignore changes to the unemployment benefit system for teenagers and focus solely on changes to AUSTUDY. The unemployment benefit changes that have occurred since 1987 have affected our control and treatment groups differently and this has not been taken into account in our work.

Second, we predict AUSTUDY eligibility on the basis of a probit regression model, rather than explicitly using our data to model eligibility directly. In future work on this issue, we plan to explicitly model eligibility for both unemployment benefit / job search allowance and AUSTUDY in an attempt to identify how each of the policy changes has affected education participation decisions (both for school and for other full-time education) of different groups of individuals over time. This will involve using group difference-of-difference estimation procedures, such as those used by Blundell, Duncan and Meghir (1995) in looking at labour supply.

V. RESULTS

1. Two-Stage Estimation Procedure

The detailed results of our two-stage estimation procedure are given in Table 4. The table reports the marginal effects of our various explanatory variables both on the probability of receiving AUSTUDY and on the probability of continuing in Years 11 and 12. These marginal effects give the percentage point

impact[18] of a unit change in the variable of interest on the probability of receiving AUSTUDY or on the probability of continuing in school. In the case of dummy variables, the marginal effect simply gives the percentage point

TABLE 4

Two-Stage Estimation Procedure

Variable	Probability of receiving AUSTUDY *Marginal effect*	*Standard error*	Probability of undertaking Year 11 or 12 *Marginal effect*	*Standard error*
Predicted AUSTUDY eligibility			0.023	0.008
Unemployment rate	–0.005	0.011	–0.002	0.009
1984			–0.314	0.030
1985			–0.288	0.034
1986			–0.288	0.035
1989	–0.117	0.055	–0.291	0.050
1990	–0.058	0.044	–0.176	0.039
1991	–0.030	0.025	–0.075	0.023
1992	–0.008	0.021	–0.002	0.020
Male	–0.009	0.014	–0.060	0.009
Father's socio-economic status	–0.003	0.000	0.002	0.000
Mother's socio-economic status	–0.004	0.000	0.001	0.000
No. of children > 15 years in household	0.025	0.007		
No. of siblings	0.022	0.004	–0.014	0.003
Region lived in at age 14:				
Other city	0.045	0.017	–0.012	0.012
Country town	0.148	0.017	–0.044	0.012
Rural area	0.225	0.024	–0.067	0.017
Overseas	0.112	0.038	0.060	0.030
Father's education:				
Degree	–0.092	0.030	0.107	0.022
Apprenticeship	–0.048	0.028	0.015	0.019
Other tertiary	–0.086	0.030	0.063	0.021
Secondary school	0.003	0.026	0.007	0.017
Mother's education:				
Degree	–0.053	0.031	0.105	0.023
Apprenticeship	–0.028	0.036	–0.048	0.026
Other tertiary	–0.033	0.029	0.036	0.020
Secondary school	–0.031	0.025	–0.025	0.017
Lived with mother only at age 14	0.274	0.034	–0.008	0.022
Lived with father only at age 14	0.092	0.050	–0.088	0.035
Lived with neither at age 14	0.051	0.080	–0.034	0.047
State where attended school:				
Victoria	0.010	0.016	0.090	0.010
Queensland	0.092	0.019	0.068	0.013
South Australia	0.092	0.024	0.074	0.017
Western Australia	0.056	0.025	–0.003	0.016
Tasmania	0.076	0.043	–0.088	0.025
Northern Territory	–0.153	0.058	0.039	0.041
Australian Capital Territory	0.006	0.030	0.155	0.023
Roman Catholic school	–0.068	0.015	0.127	0.011
Other private school	–0.144	0.022	0.179	0.017
Born overseas:				
English good	0.179	0.023	0.141	0.016
English poor	0.312	0.051	0.220	0.037
Aged 17 years	0.032	0.017	–0.116	0.012
Aged 18 years	0.082	0.025	–0.226	0.017
Year 12 cohort	0.010	0.016	–0.088	0.011
Number of observations	7,018		13,868	
Pseudo R^2	0.1801		0.1411	
Mean of dependent variable	0.342		0.662	

[18] Divided by 100.

difference in the estimated probability when the dummy variable is first set at one and then set at zero.

From the first pair of columns in Table 4, we see that family background variables, as we would expect, are important determinants of the probability of receiving AUSTUDY. In particular, the higher the socio-economic status of the individual's father and mother, the lower the probability of receiving AUSTUDY. Children of more highly educated parents are also less likely to receive AUSTUDY. A child who has a father with a degree has a significantly lower probability of receiving AUSTUDY than a child whose father has no formal education (9.2 percentage points less). Also, children who lived with their mother only at the age of 14 have a 27.4 percentage point higher probability of receiving AUSTUDY than children who lived with both their parents at that age. This presumably reflects the fact that lone mothers will have, on average, lower household incomes than two-parent families. We also see that, after controlling for the number of siblings, for every additional child aged over 15 in the household, the probability of receiving AUSTUDY increases by 2.5 percentage points. This reflects the relaxation of the income test when a family has more than one 'eligible sibling', as shown in Table 2 above. This variable, as mentioned earlier, is our identifying `instrument' in our two-stage estimation procedure and is excluded from our school participation equation. The results from Table 4 also suggest that there are important regional differences in the probability of receiving AUSTUDY, with people living in rural areas on average having a significantly higher probability than those living in capital cities (22.5 percentage points higher).

From the results of this estimation procedure, we obtain an estimate of the probability of receiving AUSTUDY for our whole sample of individuals.[19] From these predictions, we split our entire sample into two equal groups — a `treatment group' which consists of individuals from relatively poor backgrounds at whom AUSTUDY is targeted and a `control group' whose school participation decisions should not be influenced by the change in policy. We do this by placing in our treatment group all individuals whose estimated probability of receiving AUSTUDY is above the median probability. All other individuals are placed in our control group. These groups will be used explicitly later when we carry out our experimental estimation procedure.

For the purposes of the second stage of our instrumental variable estimation procedure, we use this prediction index in a different way. For our pre-1988 sample, whose continuation decision was made before AUSTUDY was introduced, we set the index equal to the average value for those individuals in

[19] For all individuals in our sample, we set the value of the 1989-92 year dummy variables equal to the mean values for our estimation sample.

school after 1988 who do not receive AUSTUDY.[20] This modified prediction index is then used in looking at the impact of AUSTUDY eligibility on the school participation decision. The results of doing this are given in the second pair of columns in Table 4. They suggest that the introduction of AUSTUDY has had a significant impact on Year 11 and 12 participation rates, increasing them on average by 2.3 percentage points for our whole sample.[21]

TABLE 5

AUSTUDY and Predicted Year 11 and 12 Participation Rates of 'Poor' Children: Two-Stage Estimation Results

	Predicted participation rate without AUSTUDY	*Predicted participation rate with AUSTUDY*	*Predicted difference or marginal effect of AUSTUDY*	*Number of observations*
1984	0.449	0.487	0.038	756
1985	0.470	0.508	0.038	836
1986	0.404	0.441	0.037	472
1989	0.501	0.540	0.039	1,300
1990	0.603	0.640	0.037	1,215
1991	0.694	0.728	0.034	1,084
1992	0.708	0.741	0.033	659
1993	0.706	0.738	0.032	612
1984–86	0.447	0.485	0.038	2,064
1989–93	0.626	0.662	0.036	4,870
All years	0.574	0.611	0.037	6,934

From the table, it is also clear that the estimated effects of family background variables are similar to those found in previous Australian studies looking at the education participation decision (for example, Miller and Volker (1987a and 1987b), Vella and Gregory (1996) and Dearden (1995)). Children whose parents have relatively high levels of education and work in higher-status occupations

[20] The average of the AUSTUDY prediction index for those individuals who were in school but did not receive AUSTUDY is -0.743, which means that for this group the average predicted probability of receiving AUSTUDY is 0.229 per cent ($\Phi(-0.743)$ where Φ is the normal cumulative distribution function). This average is imposed on our whole pre-1988 sample.

[21] This marginal effect is the estimated difference in the predicted probability of participating in Years 11 and 12 between when the AUSTUDY prediction index is set at the average level for those who receive AUSTUDY and when it is set at the average level for those who do not receive AUSTUDY (evaluated at sample means for all other variables).

TABLE 6

The School Continuation Decision: Control Group

Variable	*Marginal effect*	*Standard error*
Unemployment rate	–0.017	0.011
1984	–0.351	0.041
1985	–0.327	0.047
1986	–0.350	0.049
1989	–0.387	0.070
1990	–0.236	0.054
1991	–0.096	0.030
1992	–0.007	0.026
Male	–0.048	0.011
Father's socio-economic status	0.002	0.000
Mother's socio-economic status	0.001	0.000
No. of siblings	–0.014	0.004
Region lived in at age 14:		
Other city	0.016	0.014
Country town	–0.017	0.016
Rural area	–0.060	0.027
Overseas	0.053	0.045
Father's education:		
Degree	0.034	0.032
Apprenticeship	–0.053	0.032
Other tertiary	–0.011	0.032
Secondary school	–0.044	0.030
Mother's education:		
Degree	0.118	0.030
Apprenticeship	–0.040	0.038
Other tertiary	0.046	0.031
Secondary school	–0.001	0.030
Lived with mother only at age 14	–0.052	0.069
Lived with father only at age 14	0.041	0.076
State where attended school:		
Victoria	0.085	0.013
Queensland	0.082	0.017
South Australia	0.069	0.022
Western Australia	0.032	0.020
Tasmania	0.013	0.033
Northern Territory	0.014	0.040
Australian Capital Territory	0.113	0.024
Roman Catholic school	0.111	0.012
Other private school	0.140	0.016
Born overseas:		
English good	0.101	0.032
English poor	0.082	0.131
Aged 17 years	–0.091	0.015
Aged 18 years	–0.175	0.024
Year 12 cohort	–0.086	0.014
Number of observations	6,934	
Pseudo R^2	0.1328	
Mean of dependent variable	0.738	

are more likely to continue on to Years 11 and 12. Children from larger families, less densely populated areas and those attending government schools are less likely to complete high school. The year dummies (with the base year being 1993) have significant negative coefficients. This suggests that the positive impact of AUSTUDY on the probability of undertaking Years 11 and 12 is in addition to overall trend increases in school participation over the period under examination. After controlling for background variables, Year 11 and 12 participation rates were 31.4 percentage points lower in 1984 than in 1993. Table 4 also shows the wide differences in Year 11 and 12 participation rates by state: New South Wales (the base), Western Australia and Tasmania have significantly lower participation rates than the other states and territories.

The results from Table 4 suggest that the introduction of AUSTUDY has had a significant impact on *overall* Year 11 and 12 participation rates. We can use the results from our estimation procedure to look at what impact AUSTUDY has had on the participation decisions of children from relatively poor backgrounds (whom the policy is targeted at) and also to estimate what Year 11 and 12 participation rates would have been for such children had AUSTUDY been in operation between 1984 and 1986.[22]In doing this, we focus specifically on individuals falling into our treatment group, as it is these children from relatively poor backgrounds whom the policy is aimed at. The results of doing this are given in Table 5.

TABLE 7

The School Continuation Decision: Treatment Group

Variable	*Coefficient*	*Standard error*	*Marginal effect*	*Standard error*
Predicted continuation (in absence of AUSTUDY)	0.927	0.035	—	—
Effect of AUSTUDY policy change	0.103	0.037	0.040	0.014
Number of observations	6,934			
Pseudo R^2	0.1040			
Mean of dependent variable	0.586			

Overall, Year 11 and 12 participation rates among children from relatively poor backgrounds (after controlling for other background variables) are estimated to have increased from an average of 44.7 per cent over the period

[22] We do this by predicting an individual's likelihood of receiving AUSTUDY from our first-stage regression and using this prediction to predict what the Year 11 and 12 participation rate would have been if they had received AUSTUDY.

1984-86 to an average of 66.2 per cent over the period 1989-93. Of this increase, estimates from our two-stage estimation procedure suggest that around 3.6 percentage points or 16.7 per cent of this increase is directly attributable to the introduction of AUSTUDY.

TABLE 8

AUSTUDY and Predicted Year 11 and 12 Participation Rates of 'Poor' Children: Experimental Results

	Predicted participation rate without AUSTUDY	*Predicted participation rate with AUSTUDY*	*Predicted difference or marginal effect of AUSTUDY*	*Number of observations*
1984	0.455	0.496	0.041	756
1985	0.480	0.521	0.041	836
1986	0.396	0.436	0.040	472
1989	0.486	0.526	0.040	1,300
1990	0.598	0.638	0.040	1,215
1991	0.688	0.723	0.035	1,084
1992	0.703	0.738	0.035	659
1993	0.707	0.741	0.034	612
1984–86	0.452	0.492	0.040	2,064
1989–93	0.619	0.657	0.038	4,870
All years	0.570	0.610	0.040	6,934

2. Experimental Approach

The idea behind the second estimation procedure is to identify a control group unaffected by the policy change and to estimate the `pure' behavioural relationship for this group over the whole sample period. The control group should contain individuals whose family income is high enough that they would never be considered eligible for AUSTUDY. The control group is defined here as those for whom the predicted probability of receiving AUSTUDY is below the median. Other proxies were considered — for example, defining the control group as those with a predicted probability below the average, and using parental occupational status. However, the results were not significantly different when these other proxies were used (see Heath (1996)).

The results of estimating the determinants of the continuation decision for our control group are given in Table 6. We use the results from this table to predict

the probability of continuing for our treatment group in the absence of the policy reform. We include this prediction index as well as an AUSTUDY policy dummy variable (which takes the value one after 1988) as explanatory variables in our continuation decision equation for our treatment group. The results of doing this are given in Table 7. The results once again suggest that the introduction of AUSTUDY has had a significant impact on the Year 11 and 12 participation rates of our post-1988 sample. Again, we can use the results from this table to estimate what impact AUSTUDY has and could have had on Year 11 and 12 participation rates for each year of our sample. The results of doing this are presented in Table 8, and, reassuringly, they are similar to those obtained from our two-stage estimation procedure. The results here suggest that the introduction of AUSTUDY has increased Year 11 and 12 participation rates by around 3.8 percentage points for our treatment group. They also suggest that Year 11 and 12 participation rates would have been 4.0 percentage points higher on average between 1984 and 1986 if AUSTUDY had been in operation. Overall, Year 11 and 12 participation rates among children from relatively poor backgrounds (after controlling for other background variables) have increased from an average of 45.2 per cent over the period 1984-86 to an average of 65.7 per cent over the period 1989-93. Of this increase, estimates based on our experimental model suggest that around 3.8 percentage points or 18.5 per cent of this increase is directly attributable to the introduction of AUSTUDY.

VI. CONCLUSIONS

The AUSTUDY programme in Australia has significantly improved the probability of children from relatively poor backgrounds staying in school past the minimum leaving age. For children coming from families who are relatively disadvantaged, the proportion continuing past Year 10 has increased from around 45 per cent in 1984 to around 74 per cent in 1993, and our results suggest that just under 3½ percentage points of this increase is directly attributable to the introduction of AUSTUDY. While the effects of AUSTUDY have been significant, they are far outweighed by overall trend increases in school participation. Family background variables, such as family size and parents' educational background and socio- economic status, also remain important determinants of the school participation decision.

Schooling has been shown, in a number of studies from various countries, to be the most important factor determining a person's future labour market success in terms of access to work-related training, the probability of finding and remaining in a job, and the wages received once in work.[23] The Australian AUSTUDY programme has clearly been successful in improving school

[23] See Card (1994), Dearden (1995) and Blundell, Dearden and Meghir (1996) for detailed reviews of this literature.

TABLE 9

Distributional Consequences of Reform to Child Benefit for 16- to 18-Year-Olds

Quintile	*Household net income before reform (£)*	*Gain from introduction of education allowance (£)*	*Gain from introduction of education allowance (%)*
Bottom	183.11	8.48	4.6
2nd	275.65	4.76	1.7
3rd	375.51	1.95	0.5
4th	479.61	1.19	0.2
Top	951.78	1.12	0.1
Total	453.13	3.50	0.8

participation rates among children from relatively poor backgrounds, and this should translate into better labour market opportunities for these children over their entire working life.

Can the UK adopt an affordable AUSTUDY-type programme for secondary-school students and what would the distributional consequences of such a scheme be? One of the fundamental ideas on which AUSTUDY is based is that incentives to stay in school are greater if income support is paid directly to the child rather than to their parents. One relatively cheap policy option in the UK would be to abolish child benefit for all dependent children aged 16 to 18 and to introduce an education allowance of £10.80 per week[24] paid directly to all 16- to 18-year-olds in full-time education. Current child benefit arrangements would continue to operate for all children aged under 16. The reform will also result in £2 per week more income for families with additional dependent children under the age of 16. This gain arises because the child being paid the education allowance will receive £10.80, and the mother will now receive £10.80 rather than £8.80 for the next eldest child. This reform will not make parents on income support, housing benefit or council tax benefit any worse off, as the reduction in income due to the loss of child benefit will be entirely made up by a one-for-one increase in income support. This would not be true for parents receiving family credit, but for only a small additional cost (£50 million), they could have their benefit maintained at current levels. All other additional support that is currently paid to parents in respect of the child could remain in place. The introduction of such a scheme would cost around £170 million. The distributional consequences of the reform are shown in Table 9.

[24] This is the amount of child benefit currently paid for the eldest child.

It should be emphasised that Table 9 only shows first-round effects of the policy changes. In following years, we would expect an increase in full-time education participation as a direct result of the introduction of these child support reforms. This will only hit government coffers to the extent that the introduction of such a scheme draws teenagers away from work, rather than more expensive schemes such as Youth Training. In the longer term, we would expect the policy change to raise future earnings, as the economic returns to schooling in Britain are very high.[25] This suggests that the policy change could result in increased tax revenues in the future. Obviously, more generous income support schemes could be devised that targeted relatively poor families, but these would involve additional cost in the short run.

In practical terms, Australian education policy has gone through several changes in the last decade that have improved upon earlier policies which had a stronger tertiary education focus and were not well integrated with other aspects of labour market policy. It is clear that AUSTUDY provides relief to low-income families that would otherwise find allowing their children to complete high school to be a substantial financial burden. Although this is a worthy policy objective in itself, the empirical evidence presented in this paper suggests that AUSTUDY has also had a significant positive effect on the number of students continuing in secondary school from relatively poor backgrounds. In addition, the empirical results have confirmed earlier evidence that family background variables are important factors in schooling decisions. There is also a significant upward trend in school participation rates which appears unrelated to the AUSTUDY policy reforms. Thus it appears that the introduction of AUSTUDY has been a successful education policy initiative, although other factors continue to have important effects on secondary-school retention rates.

[25] The recent work of Harmon and Walker (1995) suggests that the economic returns to an extra year of schooling are just over 15 per cent.

APPENDIX: DETAILED SUMMARY STATISTICS

Variable	ALS sample *Mean*	*St. dev.*	AYS sample *Mean*	*St. dev.*	Whole sample *Mean*	*St. dev.*
Unemployment rate	8.162	0.338	8.127	1.964	8.137	1.667
1984	0.372	0.483			0.107	0.309
1985	0.408	0.492			0.118	0.322
1986	0.220	0.414			0.063	0.244
1989			0.262	0.440	0.186	0.389
1990			0.244	0.429	0.174	0.379
1991			0.224	0.417	0.160	0.366
1992			0.137	0.344	0.098	0.297
1993			0.133	0.339	0.094	0.292
Male	0.508	0.500	0.504	0.500	0.505	0.500
Father's socio-economic status	30.220	23.019	29.556	23.559	29.748	23.405
Mother's socio-economic status	14.566	19.898	18.933	21.345	17.673	21.030
No. of children > 15 years in household	1.879	0.852	1.835	0.854	1.847	0.853
No. of siblings	2.487	1.621	2.226	1.547	2.302	1.573
Region lived in at age 14:						
Capital city	0.476	0.499	0.492	0.500	0.488	0.500
Other city	0.195	0.396	0.177	0.381	0.182	0.386
Country town	0.215	0.411	0.222	0.415	0.220	0.414
Rural area	0.100	0.300	0.082	0.275	0.087	0.282
Overseas	0.014	0.116	0.027	0.162	0.023	0.151
Father's education:						
Degree	0.106	0.308	0.144	0.351	0.133	0.339
Apprenticeship	0.187	0.390	0.173	0.378	0.177	0.381
Other tertiary	0.072	0.258	0.099	0.298	0.091	0.288
Secondary school	0.409	0.492	0.373	0.484	0.383	0.486
Mother's education:						
Degree	0.068	0.251	0.114	0.317	0.100	0.301
Apprenticeship	0.037	0.189	0.052	0.223	0.048	0.214
Other tertiary	0.133	0.340	0.147	0.354	0.143	0.350
Secondary school	0.622	0.485	0.578	0.494	0.591	0.492
Lived with mother only at age 14	0.105	0.306	0.130	0.336	0.122	0.328
Lived with father only at age 14	0.014	0.119	0.022	0.147	0.020	0.139
Lived with neither at age 14	0.011	0.102	0.008	0.088	0.009	0.092
State where attended school:						
New South Wales	0.415	0.493	0.344	0.475	0.364	0.481
Victoria	0.264	0.441	0.271	0.444	0.269	0.443
Queensland	0.130	0.336	0.158	0.365	0.150	0.357
South Australia	0.059	0.236	0.078	0.268	0.073	0.260
Western Australia	0.076	0.265	0.083	0.276	0.081	0.273
Tasmania	0.033	0.179	0.029	0.167	0.030	0.171
Northern Territory	0.011	0.102	0.010	0.100	0.010	0.100
Australian Capital Territory	0.013	0.112	0.041	0.199	0.033	0.179

Continued on next page.

Continued from previous page.

Variable	ALS sample *Mean*	*St. dev.*	AYS sample *Mean*	*St. dev.*	Whole sample *Mean*	*St. dev.*
Government school	0.753	0.431	0.711	0.453	0.723	0.447
Roman Catholic school	0.175	0.380	0.180	0.385	0.179	0.383
Other private school	0.071	0.257	0.079	0.270	0.077	0.266
Born overseas:						
English good	0.081	0.273	0.083	0.276	0.083	0.275
English poor	0.007	0.085	0.014	0.119	0.012	0.110
Aged 16 years	0.346	0.476	0.300	0.458	0.313	0.464
Aged 17 years	0.510	0.500	0.530	0.499	0.525	0.499
Aged 18 years	0.144	0.351	0.170	0.376	0.163	0.369
Year 12 cohort	0.582	0.493	0.588	0.492	0.586	0.493

REFERENCES

Blundell, R., Dearden, L. and Meghir, C. (1996), *The Determinants and Effects of Work-Related Training in Britain*, London: Institute for Fiscal Studies.

—, Duncan, A. and Meghir, C. (1995), 'Estimating labour supply responses using tax reforms', Institute for Fiscal Studies, Working Paper no. W95/7.

Braithwaite, J. (1987), *Staying or Leaving? Commonwealth Financial Assistance to Secondary Students*, Centre for Research in Education & Work, Macquarie University and Commonwealth Department of Education.

Card, D. (1994), 'Earnings, schooling, and ability revisited', National Bureau of Economic Research, Working Paper no. 4483, October.

Centre for Educational Research and Innovation and OECD (1995), *Education at a Glance: OECD Indicators*, 3rd edition, Paris: Organisation for Economic Co-operation and Development.

Chapman, B. (1992), *AUSTUDY: Towards a More Flexible Approach*, Canberra: Australian Government Publishing Service.

Dearden, L. (1995), 'Education, training and earnings in Australia and Britain', unpublished Ph.D. thesis, University of London.

Department of Employment, Education and Training (1991), *Retention and Participation in Australian Schools 1967 to 1990*, Monograph Series no. 6, Canberra: Australian Government Publishing Service.

Department of Social Security (1988), *Department of Social Security Annual Report 1987-88*, Canberra: Australian Government Publishing Service.

Harmon, C. and Walker, I. (1995), 'Estimates of the economic return to schooling for the United Kingdom', *American Economic Review*, vol. 85, pp. 1278-86.

Heath, A. (1996), 'High school retention rates in Australia: the impact of education policy', unpublished M.Sc. thesis, London School of Economics.

Jones, F. L. (1989), 'Occupational prestige in Australia: a new scale', *Australian and New Zealand Journal of Sociology*, vol. 25, pp. 187-99.

Miller, P., Mulvey, C. and Martin, N. (1995), 'What do twins studies reveal about the economic returns to education? A comparison of Australian and U.S. findings', *American Economic Review*, vol. 85, pp. 586-99.

Miller, P. and Volker, P. (1987a), 'The youth labour market in Australia', *Economic Record*, vol. 63, pp. 203-19.

— and — (1987b), 'The youth labour market in Australia: a survey of issues and evidence', Australian National University, Centre for Economic Policy Research, Discussion Paper no. 171.

— and — (1989), 'Socioeconomic influences on educational attainment: evidence and implications for the tertiary education finance debate', *Australian Journal of Statistics*, vol. 31A, pp. 47-70.

The Treasury (1986), *Budget Papers 1986-87*, Canberra: Australian Government Publishing Service.

Vella, F. and Gregory, R. G. (1996), 'Selection bias and human capital investment: estimating the rate of return to education for young males', *Labour Economics*, vol. 3, pp. 197-219.